REMARKS

Claims 3-4 and 12 are canceled. Claims 1 and 11 are amended. Support for the amendment to Claims 1 and 11 is found at page 7, line 25, to page 10, line 17, of the specification and the original claims. All other claims are amended to specify correct dependency and to place in proper form. Claims 21-34 are new. Support for Claim 21 is found at pages 7 and 8. Support for Claim 22 is found on page 11. Support for Claim 23 is found in original Claim 2. Support for Claim 24 is found in original Claim 5. Support for Claim 25 is found in original Claim 6. Support for Claim 26 is found in original Claim 7. Support for Claim 27 is found in original Claim 8. Support for Claim 28 is found in original Claim 9. Support for Claim 29 is found in original Claim 10. Support for Claim 30 is found at page 11. Support for Claim 31 is found on page 8. Support for Claim 32 is found at page 10. Support for Claim 33 is found at page 10. Support for Claim 34 is found in original Claim 2. No new matter is believed to be introduced by the above amendment and the newly added claims.

Claims 1-2 and 5-11 and 13-34 are pending. Favorable reconsideration is respectfully requested in light of the above amendment combined with the remarks below.

At the outset, Applicants thank Examiner Vinh for the kind and helpful suggestions during the brief discussion of the present application on August 4, 2003, which is summarized and expanded upon below.

The present invention relates, in part, to a method of polishing a surface of an object by utilizing a polishing pad having a polishing part which is formed by solidifying an aqueous dispersion containing a matrix material and abrasive dispersed therein in the presence of an aqueous chemical mechanical polishing solution containing an oxidizing agent and no abrasive between a polishing surface of the polishing pad having polishing part and a surface of the object to be polished (see amended Claim 1 above). Further, the present

invention relates, in part, to a method of polishing a surface of an object by using a polishing pad having a polishing part wherein the polishing part is formed by solidifying an aqueous dispersion containing dispersed composite particles having abrasives attached thereto a matrix material in the present of an aqueous chemical mechanical polishing solution containing an oxidizing agent and no abrasives between a polishing surface of the polishing pad having the polishing part and the surface of the object to be polished (See amended Claim 11 above). The inventors have arduously worked to discover a method that provides a surface having high flatness which can be obtained at a high removal rate in a very stable manner. Further, there are much less problems with aggregation in the claimed invention than that of conventional methods.

The rejection of Claims 1-20 under 35 U.S.C. § 102(e) and/or § 103(a) over Kaisaki et al. alone or in any combination with Mueller et al. is believed to be obviated by the above amendment combined with the remarks below and the 132 Declaration attached hereto.

Kaisaki et al. discloses, at best, a polishing pad in which an abrasive is dispersed in a binder. The polishing pad according to Kaisaki et al. is manufactured using an abrasive and a binder precursor having fluidity. The binder precursor which is to form the matrix material is not used as a particle. Moreover, referring to an abrasive composite formed with a slurry consisting of a mixture of an abrasive and a binder precursor, the binder precursor according to Kaisaki et al. is not used as a particle.

In direct contrast, the present invention relates to a method of polishing by using a pad containing a matrix material having a fine particle, and an aqueous dispersion in which an abrasive and a fine particle of a matrix material are dispersed in order to form a polishing part. Further, the present invention relates to the process by which a fine particle of a matrix material is used and then an aqueous dispersion in this fine particle is solidified to form a polishing part that is excellent in dispersibility of the abrasive. The inventors of the present

application have discovered that the high dispersibility of the abrasive leads to a degree of surface flatness that is enhanced at the surface to be polished.

The Office contends that Kaisaki et al. discloses an abrasive that is attached to a matrix material based on the fact that Kaisaki et al. discloses a polymeric backing layer as an abrasive article. To the contrary, the present invention is misunderstood because Claim 11 relates to an aqueous dispersion containing a composite particle containing an abrasive that is attached to a matrix material in order to form a polishing part. In order to specify and clarify, Claims 1 and 11 have been amended above. Even in a case where a composite particle is used, a polishing part excellent in dispersibility of the abrasive is clearly obtained in the present invention. Kaisaki et al. fails to disclose or suggest anything whatsoever related to such a composite particle.

In light of the above, Kaisaki et al. clearly fails to disclose or suggest the claimed invention.

Kaisaki et al. further discloses a working liquid containing an aqueous solution that further contains a complexing agent, an oxidizing agent, a chelating agent, and the like. Mueller et al. discloses, at best, a slurry containing at least an abrasive and an oxidizing agent and further contains a multivalent metal ion as a further component therein.

In direct contrast, the present application relates to a method of polishing utilizing a specific polishing pad as described above and an aqueous chemical mechanical polishing solution in combination. Therefore, the aqueous solution does not contain an abrasive. As a result, the claimed invention leads to an excellent surface flatness. In light of the above-mentioned disclosures of Kaisaki et al. and Mueller et al., the skilled artisan would not be able to conceive that an aqueous solution containing a multivalent metal ion without containing an abrasive may be utilized. Further, nothing in either Kaisaki et al., nor Mueller et al., disclose or suggest a method utilizing a polishing pad that is formed by solidifying an

aqueous dispersion in which a matrix material and an abrasive are dispersed in the presence of an aqueous chemical mechanical polishing solution that contains an oxidizing agent and does not contain an abrasive between the polishing surface and the object to be polished.

Further, neither Kaisaki et al. nor Mueller et al. disclose or suggest the claimed method by which a polishing pad contains a solidified aqueous dispersion having composite particles containing an abrasive attached to a matrix material wherein said pad is utilized in the presence of an aqueous chemical mechanical polishing solution containing an oxidizing agent and not containing an abrasive between the polishing surface and the surface to be polished. Therefore, Mueller et al. fails to disclose what Kaisaki et al. lacks.

In light of the above, it is clear that neither Kaisaki et al. alone, nor in any combination with Mueller et al., disclose or suggest the claimed invention. Accordingly, withdrawal of this ground of rejection is respectfully requested.

Applicants provide herewith an Information Disclosure Statement containing reference WO 99/24218 in which the inventors are James et al.

James et al. disclose, at best, a polishing method utilizing a polishing pad containing an abrasive in a matrix material such as urethane and the like and an aqueous fluid which may contain an abrasive or may not contain an abrasive. The polishing pad according to James et al. is manufactured by the following method; considering a ceramic particle in the order of sub-microns is easily agglomerated, in order to prevent it from being agglomerated, a particle cluster is prepared by mixing the particle with a suitable binder (usually, aqueous dispersion) and next usually by drying it. In the example according to James et al., this particular cluster is prepared by mixing a ceramic particle into an aqueous colloidal dispersion and drying (see Example 1 of James). Then, a polishing pad (polishing layer) is prepared by mixing this particle cluster with a matrix precursor capable of having fluidity, molding or coating it, and then solidifying it by means of heating and curing.

In direct contrast to the disclosure of James, the present application relates to a method of polishing wherein a polishing pad is utilized and prepared by solidifying an aqueous dispersion prepared by adding an abrasive or dispersion containing an abrasive to an emulsion in which a matrix material is dispersed. Further, the polishing pad is manufactured without utilization of a particle cluster and without utilization of a matrix precursor. Therefore, the present application relates to a polishing method that does not use a polishing pad manufactured by solidifying a dispersion by means of heating and curing.

In light of the above, it is clear that James et al. is different from the claimed invention because the polishing pads described therein is obtained largely from a different method than that obtained in the present application. To highlight the above-mentioned differences between James et al. and the present application, Applicants have added new Claim 21, which specifies that the average particle diameter of a matrix material particle is in the range of from 0.1 to 3 μm and that the average particle diameter of an abrasive is in the range of from 0.01 to 1 μm (i.e., each is of very minute size).

In direct contrast to the claimed invention, James et al. describe that the size of the particle cluster contains an abrasive that is in the range of from 10 to 1,000 μm. Accordingly, James et al. describe a cluster that is much larger than that as claimed in the present application.

Therefore, referring to the invention of New Claim 21, the size of an abrasive and a matrix material particle, particularly, the size of an abrasive is largely different compared with that of James.

Therefore, since a fine matrix material particle and a fine abrasive are used in the present invention, the abrasive is finely dispersed in the polishing part, as a result thereof and results in the claimed polishing methods excellent in precision and surface flatness when compared with that of James et al.

In addition, New Claim 22 relates to an aqueous dispersion for preparing a polishing part that is obtained by adding an abrasive or an aqueous dispersion containing an abrasive to an emulsion obtained by emulsion polymerization, an emulsion obtained from emulsification using an emulsifying agent, or a suspension obtained by suspension polymerization. Specifically, a matrix material obtained by emulsion polymerization or the like is a high-molecular weight polymer, and it is not a precursor. Moreover, in these claimed cases, the matrix material is a particle obtained by emulsion polymerization, the particle is fine, and has a size on an order of submicrons (see New Claim 30).

In direct contrast to the claimed invention, the matrix material of James et al is obtained using mainly a precursor capable of being heated and crosslinked and this matrix component is only a component having a low-molecular weight. In addition, the matrix component used by James appears to not be obtained via emulsion polymerization.

Therefore, referring to New Claims 22 and 30, the particle diameter of the matrix component is smaller. Further, the molecular weight is larger comparing to those of the invention by James et al. From the descriptions described above, it is considered that an abrasive in the claimed polishing pad is finely dispersed as a result and a polishing method excellent in precision and surface flatness can be secured compared to the invention by James et al. Particularly, in the case of using an emulsion obtained by emulsion polymerization, the particle diameter is small, and further, the molecular weight is also large. Therefore, the present invention is once again largely different and an excellent surface flatness can be secured therefrom.

Claim 31 discloses that the claimed material constituting a matrix material is at least one selected from diene-based polymer and styrene-based polymer. That is, it consists of a non-hydrophilic material.

In direct contrast, James et al. clearly discloses that the material constituting a matrix material is a "hydrophilic" material in the description of the specification. In addition, "the hydrophilic matrix material of the present invention is sufficiently hydrophilic to provide a critical surface tension greater than or equal to 34 mN/m". In light of the above, the matrix material according to James et al. is substantially limited to hydrophilic materials. Further, James et al. discloses the critical surface tensions of polybutadiene and polystyrene are smaller than 34 mN/m. Therefore, the matrix materials of the present invention are very different from that disclosed by James et al.

According to James, a particle cluster is prepared by utilizing the method described above. Then, since there is the description in James et al. that this particle cluster "2. ···and cause dispersion of the particles within the flowable binder; 3. ···thereby dispersing the particles within a (now) solid binder, and thereby also preventing the particles from re-agglomerating;", it is considered that the particle is covered by the binder.

On the other hand, Amended Claim 11 and claims dependent thereon relate to a "composite particle" which is a particle in which "an abrasive is attached to a matrix material'. The claimed composite particle is clearly different than the disclosure of James et al. Specifically, James et al. fails to disclose or suggest a composite particle structure altogether, let alone the composite particle having the claimed structure. Particularly, James et al. neither discloses or suggests a composite particle structure in which an abrasive is electrostatically attached to a matrix material as claimed in Claims 32 and 33.

Even if the Office maintains that a *prima facie* case of obviousness exists over any of the above-mentioned references, Applicants provide herewith a 132 Declaration demonstrating that the claimed invention is surprisingly superior to that disclosed in the cited references. More specifically, Examples 1 and 2 (originally described in the present specification) are compared to Comparative Example 15 which is new. The polishing

method according to Examples 1 and 2, and Comparative Example 15 is performed on a tungsten surface. The results in the 132 Declaration (see Table 2) clearly demonstrate that Examples 1 and 2 of the present invention are more excellent than that of Comparative Example 15.

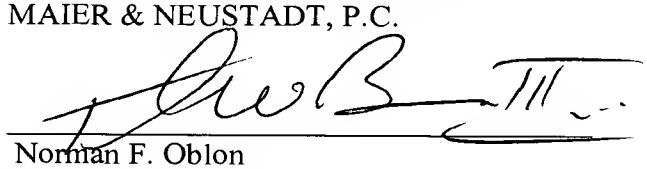
Moreover, the 132 Declaration contains originally filed Example 7 of the present specification and new Comparative Example 16. Both Example 7 and Comparative Example 16 demonstrate methods by which each pad is utilized on a copper surface. As clearly can be understood in Table 3 of the 132 Declaration, Example 7 provides a removal rate and degree of flatness that is more excellent than those of Comparative Example 16. Accordingly, the present invention is surprisingly superior to those methods disclosed in the prior art and withdrawal of these grounds of rejection is respectfully requested.

In light of the above, it is clear that neither Kaisaki et al., Mueller et al., nor James et al., in any combination or alone disclose or suggest the claimed invention. Accordingly, the present application should be indicated as allowable.

Applicants respectfully submit that the present application is in condition for allowance. Early notice to this effect is respectfully requested. Should anything further be required to place this application in condition for allowance, the Examiner is requested to contact the undersigned by telephone.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



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